

REMARKS

Reconsideration of the subject application in view of the present amendment is respectfully requested.

By the present amendment, the specification has been amended to correct formal errors therein and to describe in more detail the original drawing figure. The amendment has been effected by replacing respective paragraphs of the specification (hand-marked copies of the respective pages, as required by Rule 121, are enclosed).

The drawings have been amended to provide missing reference numerals.

Claims 1, 5, 7 have been amended.

An Abstract of the Disclosure has been canceled, and a new Abstract of the Disclosure has been added.

Based on the foregoing amendments and the following remarks, the application is deemed to be in condition for allowance, and action to that end is respectfully requested.

I. Objection to the Drawings

The Examiner objected to the drawings under 37 C.F.R § 1.84(p)(5) for not including all of the reference numerals referred to in the specification, specifically pointing out the absence of the reference numeral “6” designating the housing.

As noted above, the drawing figure has been amended to provide the missing reference numerals. In addition to the reference numeral 6 designating the housing, further reference numeral for elements shown in the drawings and described in somewhat more detail in the amended specification, have also been added.

It is respectfully submitted the foregoing amendments of the drawing and the specification do not constitute new matter. The original drawing figure contained all of the elements now specifically referred to in the specification, and their function could have been clearly understood from the drawings.

It is a long-held view that

An amendment does not constitute new matter where the amendment clarifies an inherent property of the invention as disclosed by the original application, or where it adds nothing to what a person skilled in the art would have learned from the original application, or where it includes matter clearly disclosed by drawings in the original application. (emphasis added)

U.S.P.Q. 467 (DC N. Calif. 1977)

Approval of the amended drawing figure (copy, together with a letter to the Official Draftsperson being enclosed) is respectfully requested.

II. Objection to the Abstract

The Examiner objected to the Abstract for not being in a proper form. As noted above, the presently pending Abstract has been canceled, and a new Abstract has been added. It is respectfully submitted that the new Abstract comply with the requirements of M.P.E.P. § 608.01(b).

III. Rejection of Claims

III.a. Rejection Under 35 U.S.C. § 112

The Examiner rejected claims 1-10 under 35 U.S.C. § 112, first paragraph, for allegedly not being supported by the disclosure, questioning how the interaction between the rotor and stator protects the second subassembly from oscillation (vibration) and questioning the language “protecting from oscillation” and “for limited movement along a tool axis.”

As discussed in the specification, the object of the present invention is to provide a percussion, electrical hand-held tool with reduced vibrations transmittable to the tool user.

As known, a percussion tool includes a housing, a percussion mechanism located in the housing and a drive motor for driving the percussion mechanism. During the operation of the tool, the vibrations, which occur during the return of the oscillating percussion mechanism, are transmitted to the tool housing and thereby to the tool user who holds the tool.

The present invention substantially reduces these vibrations. This is achieved, as explained in the specification (page 6, last paragraph) by forming the rotor and the transformation gear a part of the first oscillating (reciprocating) subassembly that includes the percussion mechanism. The increased mass of the movable or oscillating first subassembly can better absorb the vibrations which are caused by the recoil of the subassembly (of the percussion mechanism, transformation gear, and rotor). The stator forms part of the second subassembly that includes the tool housing. According to the present invention, the rotor not only rotates but also moves axially along its rotational axis B, as indicated in the drawing with the second double arrow I.

Further, the language “protecting from oscillation” has been deleted. As to the phrase “for a limited movement along the tool axis”, it means that the first subassembly (the percussion mechanism (3) moves along the tool axis (A), as it is

customary in percussion tools, with the movement being limited by respective stops.

In view of the above, it is respectfully submitted that the specification adequately describes the present invention, and it is respectfully requested that the rejection of claims 1-10 under submitted 35 U.S.C. § 112, first paragraph, be withdrawn.

III.b. Rejection Over the Prior Art

The Examiner rejected Claims 1-3, 6 and 7 under 35 U.S.C. § 102(b) as being anticipated by and Claims 4 and 5 under 35 U.S.C. § 103(a) as being unpatentable over Schmid, et al., U.S. Patent No. 4,456,076 (Schmid). The Examiner also rejected Claims 1-3, 6-10 under 35 U.S.C. § 102(b) as being anticipated by Eisenhardt, U.S. Patent No. 5,706,902 (Eisenhardt).

Claims 8-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Schmidt in view of Eisenhardt.

It is respectfully submitted that claims 1-10 are patentable over the cited references. Specifically, claim 1 recites that the first, oscillating subassembly, which includes the percussion mechanism, also includes a rotor of the electrical drive. This is not disclosed in the prior art. In Schmid, the rotor (9) does not form part of the oscillating subassembly (23, 24). The rotor, together with the stator and

the transmission gear, form part of the second, subassembly that also includes the housing.

Eisenhardt discloses a completely different type of a power tool, Eisenhardt does not disclose a percussion mechanism and a rotor displaceable with the percussion mechanism. Eisenhardt discloses a rotary pulse generator that operates based on a completely different principle.

A rejection based on 35 U.S.C. § 102 as in the present case, requires that the cited reference disclose each and every element covered by the Claim. Electro Medical Systems S.A. v. Cooper Life Sciences, 32 U.S.P.Q. 2d 1017, 1019 (Fed. Cir. 1994); Lewmar Marine Inc. v. Barient Inc., 3 U.S.P.Q. 2d 1766, 1767-68 (Fed. Cir. 1987); Verdegaal Bros., Inc. v. Union Oil Co., 2 U.S.P.Q. 2d 1051, 1053 (Fed. Cir. 1987). The federal Circuit has mandated that 35 U.S.C. § 102 requires no less than “complete anticipation ... [a]nticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim.” Connell v. Sears, Roebuck & Co., 220 U.S.P.Q. 193, 198 (Fed. Cir. 1983); See also, Electro Medical Systems, 32 U.S.P.Q. 2d at 1019; Verdegaal Bros., 2 U.S.P.Q. 2d at 1053.

Since Schmid and Eisenhardt fail to disclose each and every feature of independent Claim 1, Schmid and Eisenhardt, as a matter of law, do not anticipate the present invention, as defined by said independent claim.

In view of the above, it is respectfully submitted that Schmid and Eisenhardt do not anticipate or make obvious the present invention as defined in Claim 1, and the present invention is patentable over both Schmid and Eisenhardt.

Claims 2-10 on Claim 1 and are allowable for the same reasons Claim 1 is allowable and further because of specific features recited therein which, when taken alone and/or in combination with features recited in Claim 1 are not disclosed or suggested in the prior art.

CONCLUSION

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance, and allowance of the application is respectfully requested.

Should the Examiner require or consider it advisable that the specification, claims and/or drawings be further amended or corrected in formal respects, in order to place the case in condition for final allowance, then it is respectfully requested that such amendment or correction be carried out by Examiner's amendment and the case passed to issue. Alternatively, should the Examiner feel

that a personal discussion might be helpful in advancing this case to allowance, the Examiner is invited to telephone the undersigned.

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Version with Markings Showing Changes Made

causes application of disturbing vibration to a person who applies the force to the tool.

From the physics of constrained amplitude oscillations of a suspended pendulum, it is basically known that it is possible to effectively dampen particularly high oscillation amplitudes in case of resonance or reverse the oscillation amplitudes by widely spaced from each other, resonant and oscillation frequencies. With the resonant or natural frequency of the suspended pendulum, the oscillating mass and the spring constant which, with a simple percussion, electrical hand-held tool, are defined by the tool mass and the spring constant of the user when the user operates the tool, are dampened. Therefore, a certain oscillation amplitude of the percussion, electrical hand-held tool is determined dependent on the number of percussions that defines the oscillation frequency.

U.S. Patent No. 3,918,535 discloses arrangement of a preloaded compression spring in the force path between the axially displaceable percussion mechanism and the housing in order to increase the spacing between the operating points. The spring partially oscillatingly decouples the first axially displaceable subassembly, which includes the percussion mechanism,

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from the second subassembly which includes the housing. Thereby, the relative movement of the first subassembly with respect to^g the housing, which is caused by the partial oscillating separation of the first and second subassemblies, can be dampen by using a damping element. The resulting system of two decoupled, acting in the same direction, oscillators contains a relatively small mass of the first subassembly, which includes the percussion mechanism, and it is the first subassembly that is subjected to strong oscillations as a result of the recoil of the percussion. The relatively large mass of the second subassembly, which includes the housing, is subjected, dependent on its resonant frequency, only to constrained oscillations with a small oscillation amplitude.

The damping of the recoil energy by a relative movement of the second subassembly using a damping element depends basically on the dissipated portion of the deformation energy of the damping element. The recoil energy damping increases with the increase of the deformation force amplitude and the deformation path amplitude.

U.S. Patent No. 5,927,407 discloses the use of six elastomeric components for reducing the oscillations of oscillatingly decoupled

subassemblies of a hand-held tool. The elastomeric components act in the axial direction, and their viscous elastic energy dissipation is optimized in accordance with the oscillation frequency. The foregoing solution permits to reduce the oscillation amplitude only relatively to the case when a damping element is used.

Accordingly, an object of the present invention is to provide a percussion, electrical hand-held tool having reduced ^{vibrations} ~~oscillations~~ in comparison with the conventional tools.

Another object of the present invention is to provide a substantially wear-free driving chain between two, movable relatively to each other, ^{vibration} ~~oscillatingly~~ decoupled, subassemblies of a percussion, electrical hand-held tool.

SUMMARY OF THE INVENTION

These and other objects of the present invention, which will become apparent hereinafter, are achieved by providing an electrical hand-held tool for producing at least a percussion movement of a working tool and including an electrical drive, a first subassembly including a percussion mechanism and a rotor of the electrical drive rotatable about a rotor axis extending parallel to an

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The mass ratio of the two subassemblies is shifted toward the first subassembly so that, finally, the two subassemblies have substantially the same mass. As a result, the damping element, which is provided between the two subassemblies, can dissipate more recoil energy, which reduces the oscillation amplitude of the second subassembly that includes the housing.

Advantageously, the damping element is formed of a viscous elastic material which dissipates a large amount energy at the oscillation frequency in the range of the operational temperatures of a percussion hand-held tool.

The driving chain for generating the percussions and/or rotational movement of the electrical hand-held tool has substantially wear-free coupling means which provide for the relative movement. The coupling means is formed as a torque spanner coupling, with a magnetic rotary field of the stator acting on the axially displaceable, ^{brushless} collectorless rotor. In particular, mechanical force-transmitting and, therefore, wear-susceptible coupling for compensation of the relative movement between the two subassemblies becomes unnecessary. With the use of the collectorless rotor, the collectors, which are susceptible to wear during the axial movement, are also eliminated.

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The novel features of the present invention, which are considered as characteristic for the invention, are set forth in the appended claims. The invention itself, however, both as to its construction and its of operation, together with additional advantages and objects thereof, will be best understood from the following detailed description of preferred embodiment, when read with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS:

Single Figure of the drawings shows a side, partially cross-sectional view of a percussion, electrical hand-held tool according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A percussion, electrical hand-held tool 1 according to the present invention, which is shown in the drawing, includes a first subassembly with a percussion mechanism 2. The first subassembly is supported for a limited displacement along the tool axis A, e.g., 10mm, by, e.g., ^{spaced} slide or roller bearings ⁶¹ fixed secured in the housing 6.

transformation gear 4 including an eccentric and two conical gears ^{engaging} ~~engaging~~

each other at a right angle. The tool 1 further includes a ^{brushless} ~~collectorless~~ rotor 5 of

an electrical drive. The rotor 5 rotates about the rotor axis B and is supported

for a limited axial displacement along the axis B parallel to a first oscillation

path I of displacement of the first subassembly, ^{and is displaceable,} Still further, the tool 1 includes

a second subassembly displaceable along the second oscillation path II. The

second subassembly includes ^{the} a housing 6, a stator 7 of the electrical drive, and

an associated control electronics 8 for the electrical drive. The second

subassembly is protected from ^{vibrations} ~~oscillations~~, which take place along the

oscillation paths I-II, with respect to the first subassembly by a preloaded spring

9, e.g., a helical compression spring, ^{and,} ~~with respect to the oscillation along~~

~~the path II,~~ by a damping element 10 which extends parallel to the spring 9 and

is made of a viscous elastic material. ^{The spring 9 extends between}

Though the present invention was shown and described with references to the preferred embodiment, such is merely illustrative of the present invention and is not to be construed as a limitation thereof, and various modifications of the present invention will be apparent to those skilled in the art. It is, therefore, not intended that the present invention be limited to the disclosed embodiments

and the rear bearing 6' of the bearings which support the first sub-assembly for the limited axial displacement.

WHAT IS CLAIMED IS:

(Amended).

1. An electrical hand-held tool for producing at least a percussion movement of a working tool, comprising an electrical drive; a first subassembly including a percussion mechanism (2) and a rotor (5) of the electrical drive and rotatable about a rotor axis (B) extending parallel to an oscillation path (I) of the first subassembly; and a second subassembly including a housing (6) in which the first subassembly is supported for a limited movement along a tool axis (A).

2. An electrical hand-held tool according to claim 1, wherein the first subassembly includes a transformation gear.

3. An electrical hand-held tool according to claim 1, wherein the second subassembly includes a stator (7) of the electrical drive.

4. An electrical hand-held tool according to claim 1, wherein the second subassembly includes control electronics (8) for the electrical drive.

(Amended).

5. An electrical hand-held tool according to claim 1, wherein the rotor is formed as a brushless collectorless rotor.

6. An electrical hand-held tool according to claim 1, wherein the first subassembly and the second subassembly have a substantially same mass.

7. ^(Amended) An electrical hand-held tool according to claim 1, further comprising elastic spring means (9) for providing an ~~oscillation neutralizing~~ ^{vibration decoupling} connection of the first subassembly with the second subassembly.

8. An electrical hand-held tool according to claim 7, further comprising a damping element (10) arranged parallel to the spring means (9).

9. An electrical hand-held tool according to claim 8, wherein the damping element is formed of a viscous elastic material.

10. An electrical hand-held tool according to claim 9, wherein the viscous elastic material has an optimal energy dissipation at an operation temperature and at an oscillation frequency of the hand-held tool.

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